DRAFT ADVICE: Responding to Leaking High-Level Radioactive Waste Tanks

Originating Committee: TWC

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Letter Heading:

To: [Names, titles, and organizations, as appropriate] – Check boxes on last page for distribution

Subject: Responding to Leaking High-Level Radioactive Waste Tanks

Background:

The Hanford Advisory Board (Board) has consistently held a "do no harm during cleanup" value since its formation in 1994. Leaking underground storage tanks, deliberately discharged waste and past high-level waste tank leaks, and the threat of future leaks has been a central part of conversations and advice between the Board and the Tri-Party Agencies. The Board has raised concerns about the long timeframe required to mobilize infrastructure and pump a leaking tank, the lack of tank space to receive waste as tanks fail, and uncertainty around future decisions regarding removal of tank waste that has leaked into the soil.

On April 29, 2021, the US Department of Energy (DOE) publicly announced that Hanford's Single Shell High-Level Nuclear Waste Tank (SST) B-109 is leaking and filed the legally required report of a leak to US Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology). There is no dispute about whether this tank is leaking. There was a precipitous drop in "interstitial liquid" reported in the tank between December 2018 and March 2019. DOE began a formal leak assessment in July 2020. In March 2021, DOE logging of the boreholes around B-109 found very high gamma radiation levels below the tank on its south side. Interstitial liquid levels in the tank continue to decrease.

The present DOE estimate is that there are currently about 13,000 to 15,000 gallons of drainable liquid remaining. Estimates of the leak rate give us anywhere between a few and a dozen years to stop the ongoing release. This tank is also known to be subject to water intrusion from rain and snowmelt, as well as possible natural hygroscopic absorption of water from the air by the saltcake in the tank. This means that the capacity for continued leakage will not stop until this tank is retrieved. Under current planning, retrieval of this tank would not begin until the year 2043.

The Board is concerned that DOE has said in public forums that it would prefer not to take any additional action regarding the leak of SST B-109. Inaction goes against the Board's "do no harm" value and defies legal requirements to remove leaking tanks from service and remove waste immediately or as soon as feasible. DOE has referred to the amount of contamination leaking from

B-109 as "small" in comparison to contamination which was previously discharged or leaked from tanks in the same area. DOE has also referenced that, if resources were deployed to empty this tank and relocate the waste to a double-shell tank miles away, it would delay Direct Feed Low Activity Waste (DFLAW). The Board believes that there should be adequate funding to ensure that responding to the leaking of radioactive tank waste does not compete with DFLAW.

DOE's stated rationale that the B-109 leak does not currently pose a threat to human health or the environment is that "any contamination… would be captured and removed by the pump and treat systems." However, federal and state hazardous waste laws require that leaking tanks must be removed from service and waste must be removed immediately or as soon as feasible. While it is expected that contamination from the B-109 tank leak would begin to reach groundwater in 20-25 years, it would continue to add contamination to the groundwater long into the future.

The Board is concerned that there is no SST leak response plan in place for the regulatory agencies, public, and Tribal stakeholders to review. In 2013, when the SST T-111 was similarly declared to be leaking, Washington's Governor announced that the State has a "Zero Tolerance" policy for new tank leaks. The Board also submitted Advice 271[1], which among its priority recommendations advised DOE to, "remove the drainable liquid from Single-Shell Tanks, focusing first on leaking tanks." Since April, when B-109 was declared to be leaking, DOE and Washington State appear to be uncertain as to what action, if any, should be taken to resolve this threat to the environment.

The 2020 Hanford SST Liquid Retrieval Study[2] found that enhanced saltwell pumping was tied as the top contender for methods to remove additional interstitial liquid from a tank. This technology was successfully used at the Savannah River Site to remove interstitial liquid from their tanks, and it was highly rated in the 2020 study for its high design maturity and likelihood of success. In response to the study, WA Ecology proposed[3] that DOE pursue pilot projects for the top two technologies in an actual Hanford tank. This proposal was made before it was known that B-109 had formally become an active leaker. It seems a worthy effort to try to add a new liquid removal capability to the toolset at Hanford, especially if it successfully prevents active harm to the environment. The Board also observes that the Test Bed Initiative (TBI) proposes to use an in-tank pump with integrated pretreatment, followed by offsite disposal of the resulting low activity waste[4]. The Best Basis Inventory for B-109 also suggests that the interstitial liquid concentrations of sodium and cesium-137 are well-suited to the chemical requirements of the new ion exchange resin to be used in Tank-Side Cesium Removal (TSCR) and the TBI.

1 https://www.hanford.gov/files.cfm/HABAdv_271.pdf
2 https://pdw.hanford.gov/document/AR-04274
3 https://pdw.hanford.gov/document/AR-04419
4 https://www.hanford.gov/files.cfm/Final_TWC_TBIPhaseII_010919.pdf

Based on the Monthly Waste Tank Summary Report from May 2021[5], there are approximately 3.37 million gallons of drainable interstitial liquid and supernate still contained in all of the SSTs. By current estimates, we still have over four decades before the last SST is retrieved. The Board believes an actionable plan is needed to develop the tools and risk management response strategies for safeguarding human health and the environment from these wastes in the event of future leaks. DOE should also fund waste tank leak response contingency and technology development for Hanford. More tanks are certain to leak.

The Board understands that any action on the site costs a lot of money, especially actions surrounding the tanks. The Board also understands the DOE position that money is best spent when it forwards the treatment mission closer to its end. We ask DOE to remember that the goal for this mission is to stabilize and secure these wastes before they can escape to the environment and cause avoidable harm.

Advice:

The Board offers the following advice to the agencies:

1. The Board advises the TPA agencies to address leaks from Hanford's SSTs by removing leakable liquids as quickly as possible or feasible. The harm caused to the environment is irreversible and not acceptable.

2. The Board advises the TPA agencies to create a formal leak response plan for the SST System as soon as possible. This plan should be transparent and include input from regulators, the public and the Tribes. The plan could explore innovative solutions to deploying infrastructure quickly in the tank farms or the benefits of starting the process to build out infrastructure earlier than currently scheduled in tank retrieval milestones. Options for treatment of waste from leaking or at-risk of leaking SSTs should also consider how to address organics and other hazardous wastes to meet Land Disposal Restrictions.

3. The Board advises the TPA agencies to develop a feasibility assessment for all potential options to respond to the B-109 leak, including interim cover, inlet air drying technologies, saltwell pumping (including with in-tank pre-treatment), full retrieval, or any others that are reasonable to consider. Action to abate the harm from the leak must not be delayed by lengthy processes. The public should be afforded a formal comment opportunity on the response options assessment.

[5] https://pdw.hanford.gov/document/AR-14788

4. The Board advises the TPA agencies to develop greater agility to respond to future SST leaks. The TPA agencies should advocate for additional investment by DOE in technology development focused on rapid mobile retrieval of leaking tanks as a national priority. DOE Office of River Protection should also budget for SST leak contingency funding needs.

5. The Board advises the TPA agencies to deploy borehole logging and ex-tank monitoring around suspect/high-risk tanks. Based on the B-109 Formal Leak Assessment report, the Board observes that the leak assessment process for B-109 could have arrived at a determination significantly sooner if gamma borehole logging and ex-tank monitoring had been employed earlier in the process.

6. The Board advises DOE to include Ecology and potentially other non-DOE and contractor experts in the tank leak assessment process. The lead regulatory agency should be involved for any process that evaluates data to determine whether a Resource Conservation and Recovery Act (RCRA)-regulated tank has lost containment.

7. The Board advises that the TPA agencies explore innovative solutions to deploying infrastructure quickly in the tank farms and to consider starting the process to build out infrastructure earlier than currently scheduled in tank retrieval milestones.

References:

1. Hanford Advisory Board Advice #271, "Leaking Tanks (HAB Consensus Advice #271), dated September 6, 2013; https://www.hanford.gov/files.cfm/HABAdv_271.pdf

2. Single-Shell Tanks Liquid Retrieval Study, KA White, May 2020; https://pdw.hanford.gov/document/AR-04274

3. Department of Ecology's Review of Single-Shell Tank Liquids Retrieval Study, RPP-RPT-62098, Rev. 0, and Fulfillment of Tri-Party Agreement (TPA) Milestone M-045-093, Jeffery J. Lyon, December 8, 2020; https://pdw.hanford.gov/document/AR-04419

4. Hanford Tank Waste Strategy – Test Bed Initiative-Phase II, DOE Office of River Protection, January 9, 2019; https://www.hanford.gov/files.cfm/Final_TWC_TBIPhaseII_010919.pdf

5. Waste Tank Summary Report for Month Ending May 31, 2021, HNF-EP-0182 Rev 401, A.M. Templeton, July 13, 2021; https://pdw.hanford.gov/document/AR-14788

Past Board Advice on Leaking Tanks:

- Leaking Tanks Advice #298, September 20, 2018: https://www.hanford.gov/files.cfm/HAB_Advice_298.pdf

- Leaking Tanks Advice #271, September 06, 2013: https://www.hanford.gov/files.cfm/HABAdv_271.pdf.
- DOE Response to Advice #271: https://www.hanford.gov/files.cfm/HAB_ORP_Response271.pdf

CC/BCC:

☐ **TPA Agency Representatives**

- ☐ Ike White, DOE-EM
- ☐ Todd Shrader, DOE-EM
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- ☐ Portsmouth Site Specific Advisory Board
- ☐ Kelly Snyder, DDFO

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☐ **Requests to Receive Advice**

- ☐ Jessica Keys